Math 2312 FINAL Review

Exams are given on Campus, at CASA testing center, by reservation. Check the location in your reservation email as there are 3 testing centers on campus.

Students are responsible for reserving a seat for the test using schedule exams tab on CASA BEFORE the first day of the test, while seats are available.

If you miss your scheduled test; check the scheduler to see if there are other available times; if so, you can reschedule it. Your instructor does not control the scheduler; make sure you don't miss your reserved time. Final exam is mandatory for all students; no exemptions.

Don't forget to bring your ID to the CASA testing center. Bring writing utensils.

What is covered? Chapters 4, 5,6,7,8, Algebra Review Lessons.

Number of Questions: Approximately 40

Time allowed: 110 minutes

All questions are multiple choice; your grade will show up in the gradebook after you submit the test (sometimes it takes a while).

No calculators allowed during the test – study accordingly.

There will be a formula sheet available during the test. You can NOT bring your own formula sheet. Students are responsible for locating the formula sheet. If you can't find the link, ask proctors for help. You can see the formula sheet on the next page. Only those formulas will be provided.

How to study?

1) Make sure you understand the material covered in lectures.

2) Solve ALL problems on this review sheet.

Solve ALL problems on past review sheets for test 1, test 2 and test 3.

3) Take practice final. It is for practice AND extra credit. RETAKE PT Final multiple times for more practice. It will strengthen many skills that will be needed on the test.

4) Go over HW and online quizzes covering these topics.

This review should not be your only source while studying for the exam. It covers most of the "skills" you should be practicing, but it is not intended to be the only source.

Math 2312

FORMULA SHEET

$$\sin(A+B) = \sin(A)\cos(B) + \sin(B)\cos(A)$$

$$\sin(A-B) = \sin(A)\cos(B) - \sin(B)\cos(A)$$

$$\cos(A+B) = \cos(A)\cos(B) - \sin(A)\sin(B)$$

$$\cos(A-B) = \cos(A)\cos(B) + \sin(A)\sin(B)$$

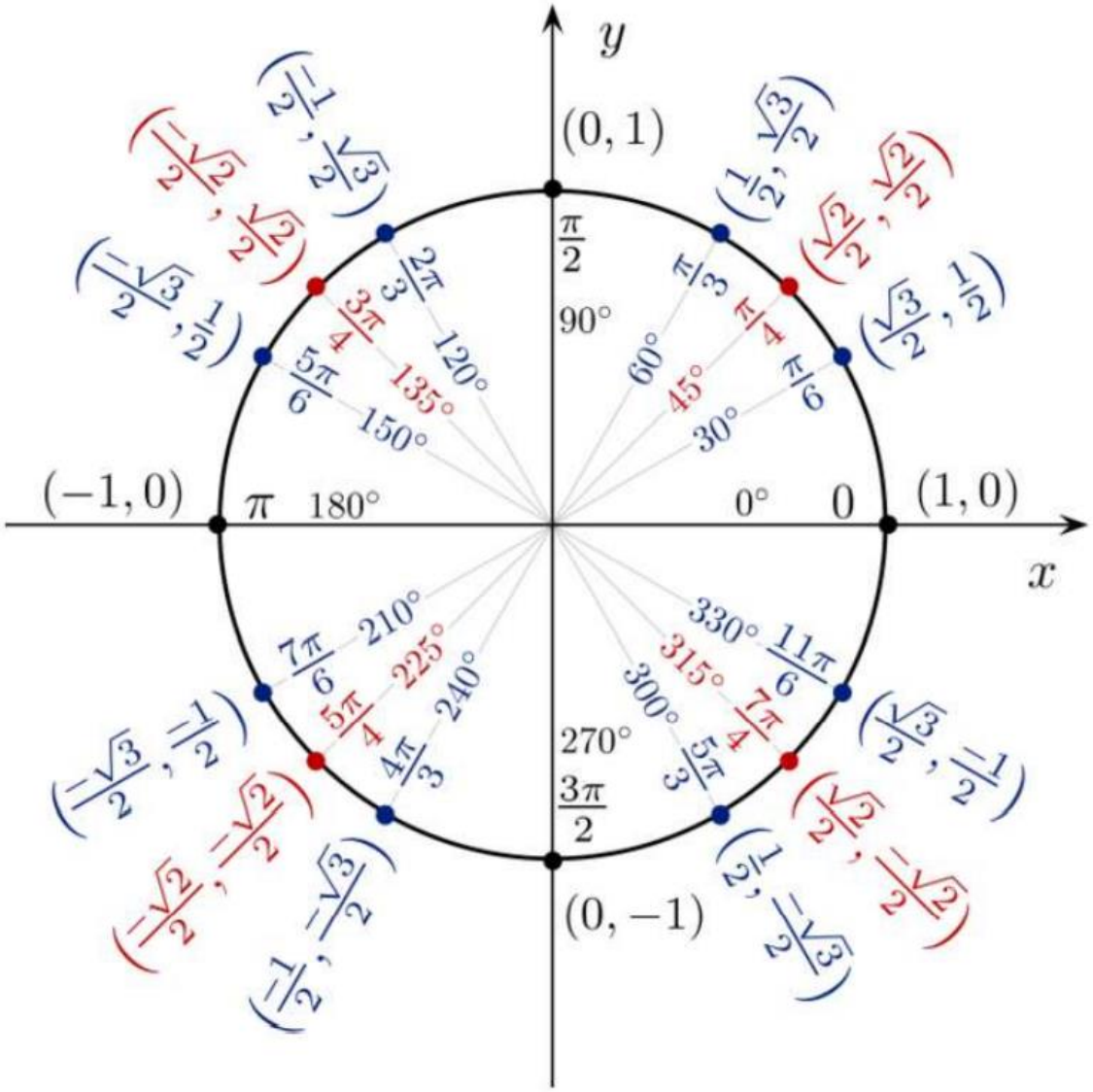
$$\tan(A+B) = \frac{\tan(A)+\tan(B)}{1-\tan(A)\tan(B)} \qquad \tan(A-B) = \frac{\tan(A)-\tan(B)}{1+\tan(A)\tan(B)}$$

$$\sin(2A) = 2\sin(A)\cos(A) \qquad \cos(2A) = \cos^2(A) - \sin^2(A)$$

$$\tan(2A) = \frac{2\tan(A)}{1-\tan^2(A)} \qquad \tan\left(\frac{A}{2}\right) = \frac{\sin(A)}{1+\cos(A)}$$

$$\sin\left(\frac{A}{2}\right) = \pm\sqrt{\frac{1-\cos(A)}{2}} \qquad \cos\left(\frac{A}{2}\right) = \pm\sqrt{\frac{1+\cos(A)}{2}}$$

Unit Circle will NOT be provided.



1. Evaluate the following: (Testing unit circle!!!)

a) $\sin\left(\frac{2\pi}{3}\right)$

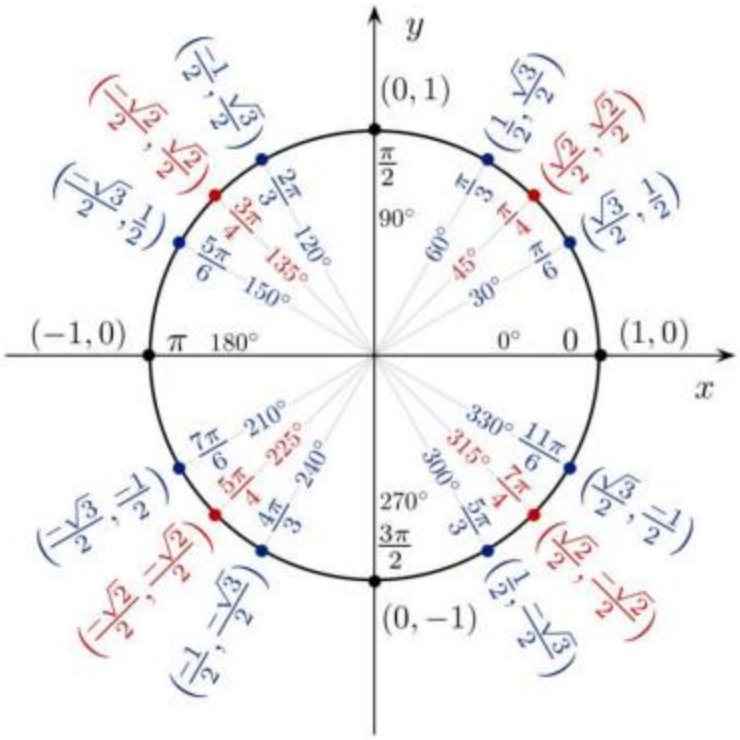
b) $\cos\left(\frac{5\pi}{6}\right)$

c) $\sin\left(-\frac{\pi}{3}\right)$

d) $\tan\left(\frac{2\pi}{3}\right)$

e) $\tan\left(\frac{11\pi}{6}\right)$

f) $\cos\left(-\frac{3\pi}{4}\right)$



2. Evaluate the following:

a) $\sin(10\pi)$

b) $12\cos(25\pi)$

c) $5\cos(24\pi)+2\sin(15\pi)$

3. Evaluate the following:

a) $\arccos\left(\frac{1}{2}\right)$

b) $\arcsin\left(\frac{\sqrt{2}}{2}\right)$

c) $\arctan(-1)$

d) $\arcsin\left(\frac{\sqrt{3}}{2}\right)$

e) $\arccos(0)$

f) $\arcsin(0)$

The following table lists the most common "inverse trig" function values. Make sure you know these and understand why these are true. If you know the unit circle, you know the values listed here; you just need to think "backwards" and know the range restrictions.

$\arcsin(-1)=-\frac{\pi}{2}$	$\arccos(-1)=\pi$
$\arcsin\left(-\frac{\sqrt{3}}{2}\right)=-\frac{\pi}{3}$	$\arccos\left(-\frac{\sqrt{3}}{2}\right)=\frac{5\pi}{6}$
$\arcsin\left(-\frac{\sqrt{2}}{2}\right)=-\frac{\pi}{4}$	$\arccos\left(-\frac{\sqrt{2}}{2}\right)=\frac{3\pi}{4}$
$\arcsin\left(-\frac{1}{2}\right)=-\frac{\pi}{6}$	$\arccos\left(-\frac{1}{2}\right)=\frac{2\pi}{3}$
$\arcsin(0)=0$	$\arccos(0)=0$
$\arcsin\left(\frac{1}{2}\right)=\frac{\pi}{6}$	$\arccos\left(\frac{1}{2}\right)=\frac{\pi}{3}$
$\arcsin\left(\frac{\sqrt{2}}{2}\right)=\frac{\pi}{4}$	$\arccos\left(\frac{\sqrt{2}}{2}\right)=\frac{\pi}{4}$
$\arcsin\left(\frac{\sqrt{3}}{2}\right)=\frac{\pi}{3}$	$\arccos\left(\frac{\sqrt{3}}{2}\right)=\frac{\pi}{6}$
$\arcsin(1)=\frac{\pi}{2}$	$\arccos(1)=0$

$\arctan(-1)=-\frac{\pi}{4}$
$\arctan(0)=0$
$\arctan(1)=\frac{\pi}{4}$
$\arctan\left(\frac{\sqrt{3}}{3}\right)=\frac{\pi}{6}$
$\arctan\left(\sqrt{3}\right)=\frac{\pi}{3}$
$\arctan\left(-\sqrt{3}\right)=-\frac{\pi}{3}$
$\arctan\left(-\frac{\sqrt{3}}{3}\right)=-\frac{\pi}{6}$

4. Evaluate the following: $\cos\left(\arctan\left(\frac{1}{4}\right)\right)$

5. Evaluate the following: $\sec\left(\arcsin\left(\frac{4}{5}\right)\right)$

6. Given: $0 < \theta < \frac{\pi}{2}$ and $\tan\theta = \frac{1}{3}$, find $\sin\theta$.

7. Given: $\pi < \theta < \frac{3\pi}{2}$ and $\tan\theta = \frac{1}{3}$, find $\sin\theta$.

8. Simplify the following expression: $\dfrac{40\sin(-x)\cos(-x)}{\cos^2 x - \sin^2 x}$

9. Simplify the following expression: $\dfrac{12\cos^2 x + 12\sin^2 x}{\cot(x)}$

10. Find the horizontal shift for the following functions:

a) $f(x)=2\sin(4x-12)+5$

b) $f(x)=2\cos(3x+21)+5$

c) $f(x)=10\cos(\frac{1}{2}\pi x-\pi)+5$

d) $f(x)=10\cos(\frac{1}{8}\pi x+\pi)+5$

11. Which of the following is a cosine function that has amplitude 10 and period 4?

Choices:

a) $y = 10\cos(4x)$

b) $y = 10\cos(2\pi x)$

c) $y = 10\cos\left(\frac{\pi}{2}x\right)$

d) $y = 10\cos\left(\frac{\pi}{4}x\right)$

12. Find the maximum and minimum values of the following functions:

a) $f(x) = 10\sin(4x) + 8$ Max:_____ Min: _____

b) $f(x) = 15\cos(2x) - 4$ Max:_____ Min: _____

For #12: What are the ranges of the functions given in (a) and (b)?

13. If x lies in quadrant I and $\sin(x) = \frac{1}{5}$, find the value of $\sin(2x)$.

14. If x lies in quadrant I and $\sin(x) = \frac{1}{4}$, find the value of $\cos(2x)$.

15. If $\angle A$ and $\angle B$ are acute angles with $\sin(A)=\frac{5}{13}$ and $\tan(B)=\frac{3}{4}$;

Find the value of: $\cos(A+B)$.

16. Solve the following equation over the interval $\left[0, \frac{\pi}{2}\right)$:

$$\sin(4x) = -\frac{1}{2} .$$

17. Solve the following equation over the interval $[0, \pi)$:

$$\sin(2x) = -\frac{\sqrt{3}}{2} .$$

18. Solve the following equation over the interval $[0,2\pi)$:

$$2\cos(x)+9=10$$

19. Solve the following equation over the interval $[0,2\pi)$:

$$6\cos(x)+6=0$$

20. A ramp leading to the freeway overpass is 190 feet long and rises 32 feet. What is the angle of elevation of the ramp to the freeway?

21. KLM is a triangle with KL = 5, LM = 8, KM =6. Find the value of $\cos(K)$.

22. Let $\vec{a} = 2\vec{i} + 5\vec{j}$ and $\vec{b} = -4\vec{i} + \vec{j}$. Find:

a) $5\vec{a} + 6\vec{b}$

b) Find the magnitude of the vector $\vec{b}$.

c) Find the dot product: $\vec{a} \bullet \vec{b}$.

23. Classify the following:

Choices: Circle, ellipse, hyperbola, parabola, none of the above.

$\frac{(x-5)^2}{9}+\frac{(y+1)^2}{16}=1$

$(y+1)^2=8(x+2)$

$\frac{(x-5)^2}{9}-\frac{(y+1)^2}{16}=1$

$(x+1)^2=-12(y+2)$

$(x-5)^2+(y+1)^2=16$

24. Write in standard form and find the center and vertices: $9x^2+4y^2-36x-8y=-4$.

25. Write the equation of a circle with radius 5 and center (-1,4).

26. Find the center and radius of the following circle: $x^2 + y^2 + 4x - 6y + 9 = 0$

27. State the coordinates of the vertex of the following parabola:

a) $x^2 + 4x - 4y - 8 = 0$

b) $y^2 - 20y + 108 + 4x = 0$

28. State the length of major axis and vertices for the following ellipses:

a) $\frac{x^2}{16}+\frac{y^2}{25}=1$ length of major axis: _____ vertices:_____

b) $\frac{x^2}{49}+\frac{y^2}{25}=1$ length of major axis: _____ vertices:_____

Exercise: Which of the following is the graph of: $\frac{(x-2)^2}{9}+\frac{(y+2)^2}{16}=1$.

Choices will have graphs and you need to find the right graph.

29. Solve this system to find the point(s) of intersection:

$$4x^2 + 7y^2 = 23$$
$$3x^2 - y^2 = 11$$

ALGEBRA REVIEW

30. Let $f(x) = 5x^2 + 7$. Find the difference quotient $\dfrac{f(x+h) - f(x)}{h}$.

31. A) Let $f(x)=\dfrac{\sqrt{4x+1}}{x^2-x}$. Find the domain of this function.

B) Let $f(x)=\dfrac{\sqrt{8x+16}}{x-12}$. Find the domain of this function.

32. Let $f(x)=2\ln(x)+5$ and $g(x)=e^{10x}$. Find $(f\circ g)(6)$

33. Let $f(x)=4\ln(x)$ and $g(x)=10e^{x}$. Find $(g\circ f)(2)$

34. Let $f(x)=\dfrac{x-1}{x^2+11x-12}$.

Find Vertical asymptote(s) of f(x):

Find the horizontal asymptote of f(x):

Note: Practice factoring quadratics! You must factor the denominator and cancel common factors (if any) to find the Vertical Asymptotes.

35. Solve for x: $2^{2x+5} = 16^{x}$

36. Solve for x: $2\log_5(x) + 10 = 14$

37. Which of the following is a vertical asymptote for: $f(x)=\dfrac{4-8\sin(x)}{10+20\cos(x)}$

a) $x=\dfrac{\pi}{6}$

b) $x=\dfrac{\pi}{3}$

c) $x=\dfrac{4\pi}{3}$

d) $x=\dfrac{5\pi}{6}$

e) None

38. Which of the following is a function with horizontal asymptote $y=2$?

A) $f(x)=\dfrac{1}{x-2}$

B) $f(x)=\dfrac{2x^5+1}{x^5-4}$

C) $f(x)=\dfrac{2x}{x^2+2}$

D) $f(x)=2e^x-1$

E) None

39. What is the domain of: $f(x)=\dfrac{\ln(x-1)}{x-4}$

40. Find the vertical asymptote(s) for: $f(x)=\ln\left(x^2-5x-6\right)$

41. Given: $f(x) = \log_2(5x+1)$ Find (a) $f(3) = ?$ (b) $f^{-1}(1) = ?$

41. Given: $f(x) = 5e^{4x+1}$ Find (a) $f(2) = ?$ (b) $f^{-1}(10) = ?$

Exercise: Use properties of logarithm to rewrite:

a) $\ln\left(\dfrac{x^3\sqrt{y}}{(x+1)^2}\right)$

b) $2\log(x)-3\log(x+4)+\dfrac{1}{2}\log(x+2)$

Exercise: Solve for x: $\log_2(5x)-\log_2(x+4)=2$

Take and retake the practice final.

GOOD LUCK ON YOUR FINAL EXAM!!!!